REMARKS

Claims 50-53, 55-63 and 65-71 are pending. Claim 64 is cancelled; Claims 50, 56-63 and 65-67 are amended and new Claim 71 is added. Reconsideration of the July 31, 2002 Official Action is respectfully requested.

Claims 50-53, 55-70 are rejected under 35 U.S.C. § 102(a) over U.S. Patent No. 5,522,934 to Suzuki et al. ("Suzuki"). The reasons for the rejection are set forth in numbered paragraph 3 of the Official Action.

Claim 50, as amended, recites an inductively coupled plasma processing system, which comprises, *inter alia*, "a substrate holder supporting a substrate having a periphery within said processing chamber, the substrate holder including an electrode", and "a process gas distribution system for introducing a process gas into said processing chamber, the process gas distribution system comprising injectors which direct the process gas along axes that intersect an exposed surface of the substrate at an acute angle, each of the injectors being spaced outwardly from the periphery of the substrate". Support for the amendments to Claim 50 can be found, for example, at page 12, lines 20-29 of the specification. Suzuki does not disclose the combination of features recited in Claim 50 for the following reasons.

Suzuki discloses a plasma processing apparatus 2 shown in FIG. 2, which comprises a susceptor 6, a susceptor support table 8, a ceramic heater 18, a cooling jacket 20 formed in the susceptor support table 8, and an RF power supply 16 connected to the susceptor 6. The ceramic heater is connected to a power supply and temperature controller, which heat

the ceramic heater 18 to a predetermined temperature. The cooling jacket 20 circulates cooling water having a predetermined temperature (col. 3, line 58 - col. 4, line 54).

Referring to FIG. 4, Suzuki discloses that the source gas supply nozzle 52 can be positioned to provide a distance between the distal end of the nozzle and the wafer edge (col. 6., lines 38-45). However, the nozzle 52 is horizontal and thus its axis is parallel to the exposed upper surface of the wafer G, which is subjected to plasma processing. The nozzle does not "direct the process gas along axes that intersect an exposed surface of the substrate at an acute angle", as recited in Claim 50. Accordingly, Suzuki fails to disclose the combination of features recited in Claim 50, which is thus also patentable over Suzuki.

Suzuki also fails to disclose the combinations of features of dependent Claims 51-53 and 55-57 and 59-63 for at least the same reasons as those for Claim 50. Claim 59, as amended, recites the feature of "at least some of the injectors include an orifice oriented to direct the process gas in an upward direction away from the substrate" (emphasis added). Support for the amendments to Claim 59 can be found at FIG. 5 and page 13, lines 13-27 of the specification. Suzuki does not disclose injectors that include an orifice oriented to direct a process gas in an upward direction away from the wafer W. Accordingly, Suzuki does not disclose the combination of features recited in Claim 59. Thus, Claim 59 also is patentable over Suzuki.

Claim 62 recites the feature of "at least some of the injectors connected to the primary gas ring direct the process gas along axes that intersect an exposed surface of the substrate at an acute angle". Claim 63 depends from Claim 62 and recites the feature of "some of the injectors include an orifice oriented relative to the axis thereof to direct the

process gas in an upward direction away from the substrate and toward the dielectric window". The combinations of features recited in Claims 62 and 63 also are patentable over Suzuki for reasons stated above.

Claim 58 has been rewritten in independent form. Claim 58, as amended, recites an inductively coupled plasma processing system, which comprises, *inter alia*, "a process gas distribution system which provides process gas into the processing chamber, the process gas distribution system including injectors which direct the process gas along axes that intersect an exposed surface of the substrate at an acute angle, each of the injectors being spaced outwardly from the periphery of the substrate". Suzuki fails to disclose the combination of features recited in Claim 58 for reasons set forth above.

Claim 65 has been amended to recite the features of "a substrate support supporting a substrate within the processing chamber, the substrate having a periphery" and "a gas supply for introducing a process gas into the processing chamber, the gas supply including injectors which direct the process gas along axes that intersect an exposed surface of the substrate at an acute angle, each of the injectors being spaced outwardly from the periphery of the substrate". For reasons stated above, Suzuki fails to disclose the combination of features recited in Claim 65. Thus, Claim 65 also is patentable over Suzuki.

Claims 66-70 depend from Claim 65 and thus recite combinations of features that also are patentable over Suzuki for at least the same reasons as those for Claim 65.

New Claim 71 depends from Claim 50 and recites the feature of "a plurality of gas flows overlap each other in a plane parallel to an exposed surface of the substrate". Support for Claim 71 can be found in U.S. Application No. 08/672,315, filed on June 28,

1996 (now abandoned), and incorporated herein by reference in the paragraph bridging pages 10 and 11 of the specification. U.S. Patent No. 6,270,862 is a continuation of U.S. Application No. 08/672,315. See MPEP § 608.01(p)(I) regarding incorporation by reference. The specification has also been amended to incorporate the subject matter recited in Claim 71, as supported by incorporated U.S. Application No. 08/672,315. Claim 71 is also patentable.

For the foregoing reasons, withdrawal of the rejection and prompt allowance of the application are respectfully requested.

Respectfully submitted,

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Marked-up Specification

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A plurality of gas flows can overlap each other in a plane parallel to an exposed surface of the substrate.

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Marked-up Claims 50, 56-63 and 65-67

50. (Twice Amended) An inductively coupled plasma processing system, comprising:

a plasma processing chamber;

a substrate holder supporting a substrate having a periphery within said processing chamber, the substrate holder including an electrode;

an electrically-conductive coil disposed outside said processing chamber;

[means] a process gas distribution system for introducing a process gas into said processing chamber, the process gas distribution system comprising injectors which direct the process gas along axes that intersect an exposed surface of the substrate at an acute angle, each of the injectors being spaced outwardly from the periphery of the substrate;

an RF energy source which inductively couples RF energy into the processing chamber to energize the process gas into a plasma state,

[means for maintaining] wherein the substrate holder is maintained at a selected temperature [of about 80°C to 200°C] during deposition of a material on the substrate by plasma-enhanced chemical vapor deposition.

56. (Twice Amended) The system of Claim [56] 50, wherein the [system further comprises an] substrate holder comprises a ceramic material and the electrode is buried within the ceramic material [substrate holder and an RF generator connected to the electrode].

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57. (Amended) The system of Claim 50, wherein the [means for introducing comprises a gas supply including] injectors include orifices, [at least some] each of the orifices [orienting] orient the process gas along an axis of injection which intersects an exposed surface of the substrate at an acute angle.

58. (Amended) [The system of Claim 50, wherein the coil is substantially planar.] An inductively coupled plasma processing system, comprising:

a plasma processing chamber;

a substantially planar electrically-conductive coil;

a substrate support supporting a substrate having a periphery within the processing chamber;

a process gas distribution system which provides process gas into the processing chamber, the process gas distribution system including injectors which direct the process gas along axes that intersect an exposed surface of the substrate at an acute angle, each of the injectors being spaced outwardly from the periphery of the substrate; and

an RF energy source which inductively couples RF energy into the processing chamber to energize the process gas into a plasma state;

wherein the substrate holder is maintained at a selected temperature during deposition of a material on the substrate by plasma-enhanced chemical vapor deposition.

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59. (Amended) The system of Claim 50, [further comprising an RF bias power source connected to the substrate holder] wherein at least some of the injectors include an orifice oriented relative to the axis thereof to direct the process gas in an upward direction away from the substrate.

60. (Amended) The system of Claim 50, wherein the [means for introducing the] process gas distribution system comprises a primary gas ring that directs the process gas toward the substrate.

61. (Amended) The system of claim 60, wherein the [means for introducing the] process gas distribution system further comprises a secondary gas ring, the primary gas ring is between the secondary gas ring and the substrate holder.

62. (Amended) The system of Claim 60, wherein the [means for introducing the] process gas distribution system [further] comprises injectors connected to the primary gas ring, at least some of the injectors connected to the primary gas ring direct the process gas along axes that intersect an exposed surface of the substrate at an acute angle.

63. (Amended) The system of Claim 62, wherein some of the injectors include an orifice oriented relative to the axis thereof to direct the process gas in [a] an upward direction away from the substrate.

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65. (Amended) An inductively coupled plasma processing system, comprising:

a plasma processing chamber;

a substrate support supporting a substrate within the processing chamber, the substrate having a periphery;

an electrode operable to heat the substrate support;

a gas supply for introducing a process gas into the processing chamber, the gas supply including injectors which direct the process gas along axes that intersect an exposed surface of the substrate at an acute angle, each of the injectors being spaced outwardly from the periphery of the substrate; and

an RF energy source inductively coupling RF energy into the processing chamber to energize the process gas into a plasma state,

wherein the electrode is maintained at a selected temperature [of about 80°C to 200°C] during deposition of a material on the substrate by plasma-enhanced chemical vapor deposition.

66. (Amended) The system of Claim 65, wherein the substrate support comprises a ceramic material and the electrode is buried within the ceramic material comprising the substrate support.

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67. (Amended) The system of Claim 65, further comprising an RF bias power source connected to the electrode, wherein the RF bias power source is operable to regulate a level of RF bias applied to the substrate so as to control the substrate temperature.